Electricity

Electricity is a property belonging to, or capable of being communicated to, all substances whatever; and whereas by some of them it is transmitted with great ease, and by others with much difficulty, they have been divided into two classes and denominated conductors and non conductors of Electricity also the latter receiving this power by friction, and other means are termed Electrics, and the former non-electrics; Metals of all kinds, and water are conductors; though in very different degrees; so also ~~a perfect vacuum~~ is charcoal All other substances, and also a perfect vacuum are non-conductors of electricity, But many of these substances, when the are made very hot, as glass, resin bake wood, and perhaps all the rest on which the experiment can be made in this state are conductors it is the property of all kinds of electrics, when they are rubed by bodies different from themselves to attract light substances of all kinds, to exhibit an appearance of light, attended by a praticular sound, an the approach of any conductor, and if the nostrils are presented, they are affected with a smell like Phosphorus. This attraction is most easily explained by supposeing that electricity is produced by a fluid exceedingly elastic, or repulsive of itself, and attracted by all other substances—

2 An Electric exhibiting the appearances above mentioned, is said to be excited, and some of them, particularly the tourmaline, are excited by heating and cooling, as well as by friction. It appears, however that excitation consists in the mere transferring of Electricity from one substance to another and that the great source of electricity is in the earth, on this account it is necessary to the considerable excitation of any electric, that the substance against which it is rubbed have a (hence termed the rubber) communication with the earth by means of conductors; for if the rubber be insulated, that is cut off from all communication with earth by means of electrics, the friction has but little effect, When insulated bodies have been atracted by and brought into contract with, an excited electric, they begin to be repelled by it, and also to repel one another; nor will they be attracted again till they have been brought into contact with some

conductor communicating with the Earth; but after this they will be attracted as at first.

If conductors be insulated, electric powers may be communicated to them by the approach of excited electrics, or the contact of other electrified bodies. They will then attract light bodies, ~~electrics~~ and give sparks, &c. like the excited electrics themselves. When electricity is strongly communicated to insulated animal bodies, the pulse is quickened, and perspiration increased; and if the receive, or part with electricity on a sudden, a painful, sensation is felt at the place of communication, But what is more extraordinary, is that the influence of the Brain and nerves upon the muscles seemes to be of an electric nature this is one of the last and most important of all philosophical discoveries I shall, therefore, give the result, of all the observations that have hitherto been made on the subject, in a series of propositions,

drawn up by an intelligent friend, who has given more atention to it than I have done, 1 the nerve of the limb of an animal being laid bare, and surrounded with a piece of sheet lead, or of tinfoil if a communication be formed between the nerve thus armed and any of the neighbouring muscles, by means of a piece of Zinc, strong contractions will be produced in the limb. 2 If a portion of the nerve which has been laid bare be armed as above contrac, will be produced as powerfully, by forming the communication between the armed and bare part of the nerve, as between the armed part and muscle 3 A similar effect is produced by arming a nerve and simply touching the armed part of the nerve with the metallic conductor. 4 Contractions will take place if a muscle be armed, and a communication be formed by means of the conductor between it and a neighbouring nerve the same effect will be produced if the communication be formed between the armed muscle and another muscle, which is contigous to it

of Contractions may be produced in the limb of an animal by bringing the pieces of metal into contact with each other at some distance from the limb, provided the latter make part of a line of communication between the two metallic conductors, The experiment which proves this is made in the following manner, The amputated limb of an animal being placed upon a table, ~~and~~ let the operator hold, with one hand the principal nerve previously laid bare, and in the other let him hold a peice of Zinc, let a small plate of lead or silver be the laid upon the table, at some distance from the limb, and a communication be formed by means of water, between the limb and the part of the table where the metal is lying. If the operator touch the piece of silver with the Zinc, contractions will be produced in the limb the moment that the metals come into contact with each other. The same effect will be produced if the two peices of metal be previously placed in contact and the operator touch one of them with his fingers This fact was discovered by Mr W. Cruikshank

6 Contractions can be produced in the amputated leg of a frog, by putting it into water, and bringing the two metals into contact with each other at a small distance from the limb, 7 The influence which has passed through, and excited contractions in one limb, may be made to pass through and excite contractions in, another limb, In performing this this experiment it is necessary, to attend to the following circumstances: let two amputated limbs of a frog be taken; let one of them be laid upon a table, and its foot be folded in a piece of silver let a person lift up the nerve of this limb with a silver probe, and another person hold in his hand a peice of Zinc, with which he is to touch the Silver including the foot let the person holding the Zinc in one hand catch with the other the nerve of the second limb, and he who touches the nerve of the first limb is to hold in his other hand the foot of the second Let the Zinc be now applied to the Silver including the foot of the first limb, and contractions will immediatly be excited in both limbs 8 The heart is the only involuntary muscle in which contractions can be excited by these experiments

of Contractions are produced more strongly, the farther the coating is placed from the origen of the nerve. ¶ Animals which were almost dead have been found to be considerable revived by exciting this influence. ¶ When these experiments are repeated upon an animal that has been killed by opium, or by the electric shock very slight contractions are produced; and no contractions whatever will take place in an animal that has been killed by corrosive sublimate, or that has been starved to death. ¶ Zinc appears to be the best exciter when applied to gold, silver, molybdena, steel, or copper. The latter metals, however, excite but feeble contractions when applied to each other. Next to Zinc, in contact with these metals, tin, Lead, and Silver and Lead appear to be the most powerful exciters. At Least two kinds of fishes, the torpedo and the electrical eel, have a voluntary power of giving so strong a shock to the water in which the swim as to affect fishes and other animals which come near them; and by a conducting communication between different parts of these fishes an electric

8 may be given exactly like that of the Leyden vial, which will be described hereafter; and if the communication be interrupted a flash of electric light will be perceived. The growth of vegetables is also quickened by electricity.

No electric can be excited, provided that body be insulated; for this insulated rubber will attract light bodies, give sparks and make a snapping noise, upon the approach of a conductor, as well as the excited electric, if an insulated conductor be pointed or if a pointed conductor communicating with the earth, be held pretty near it little or no electric appearance will be exhibited, only a light will appear at each of the points during the act of excitation, and a current of air will be sensible from them both.

Inflamation of parts — . . I dispersed infla-
mation, sugar of lead does more harm than good, the best
remedys are fomentations & cold water or ice applied to
the part, whenthe inflamation is external & the lead wa-
ter can come at it then it is good. Of Fractured

. . Fractured Limbs . . — Intreating upon
this operation, the opinion of the France & English
Surgeants are very different, the English apply
splinters of a flexible nature, as, paste board with
splits in it, or linnen with whale bone in it as the
form of stays; the French Surgeants apply firm sp-
linters which will not yield; this I prefer & think
their the best, for there is no need of any moving of
the member, which if there should be, then the limb
would become unstraid or would get out of its
proper position & cause some very troublesome cir-
cumstances if not cause the patient his life, here
we see that the elastic or flexible splinters will allow

this unequical bones & moving of the member
which is extremely prejudicial, when the firm un
elastic splinter suffers no thing of this kind which
is very right, therefore let it be laid down as a rule
viz. When a Fracture of the forearm or le
Scapula . . This is a very troublesome &
difficult part to keep in its proper situation
owing to the inconvenience of applying splinters
&c but to do what we can are, tho' the ends of
the bones are very apt to lap over each other,
therefore let there be a cushion of an elastic
nature be applied under the auxila or arm pit
to keep it from coming in, & favouring the lapping
of the bones, tho' the cushion is to extend tapering
along down the ribs about half of the humeri
the confined to the thorax, & then pressing the a
arm to the side which will extend the upper

fast out & keep the scapula extended & prevent the
lapping of the two ends, now after the lower part of the
humerus is fixed in the ligature which does it must
turn & go over the shoulder, then the patient must
keep quiescent &c. . . Fracture of the Forearm. .
. The splinters should be applied the whole —
length of the arm & no pressure made near the fra
tured part but some distance off. so that the
part may have sufficient room for the circu
lation &c. The splits of wood should be, to render
them free from injuring the parts, made & have a
ring of pillars or pads upon the internal side,
to keep the radius & ulna from coming too near
together by the pressure, which they are apt to do,
the splits with the cushions applied to press in
between the two bones, & a third, that is, if the
radius be broken only after the splits be applie

as I have said, then one upon the top of the radius, to extend from the condyle of the upper joint to that of the wrist, & lay upon the extremities, by this will touch the middle of the radious & keep it right; & if the ulna be fractured apply one in the same way, & if both be fractured four are requisite as one on each side of the arm, one upon the top & one at the bottom, the best curlian, is a bag made the length of the member & filled with chaff which is the best it is not flexible & whatever the position it be put in it will remain, which is very well accommodated to the advantage of filling up the concavities which will be between the splint & limb. rolers are used by many but I hardly think them to be of much service, & when the part be inflamed all compressi

ur is actually not an necessary evil, which the splin-
ters are, but very prejudicial & ought always to be a-
voided, as soon as we discover the parts to inflame
these compressions should be withdrawn & the part
attended to with a cold solution of lead water, or am-
moniac or vinegar, but sometimes the best advan-
tages arise from a decoction of bitter herbs, the part
to be bathed in this warm fomentation so as to
cause perspiration which is of much service. . .

. . Fracture of the Femoris & Leg.

In these cases we are to distend the whole member &
keep the patient on his back, & the splinter on each
side of the member, on the external side have the splinter
to extend to some distance up even to or above the first rib
& a bandage round the abdomen & a compress to fill
up the cavity which is formed immediately after
leaving the bulge of the ilium, & the long bags of chaff

as I have said above, are to be applied between the member & split, the split should be about four inches wide or more, down at the food, it must be extended that is the foot, by applying & wrapping a bandage round the ankle & cross the foot there having an cross bar or the like, from the two ends of the splinters, & in a center with the foot drawing at the bandage & confining to this cross bar, so as to have the limb very tightly extended, after a least ten days the part should be looked at & if not straight make it so, rollers may be applied if you think proper & no inflamation appear, but when this occurs free the part from all pressure &c. & treat as I have said above, observe there is a bandage that goes from the top of the external splint down around the ischium so that when the foot is pulled at & confined by this bar in contact with this splint, then this bandage around the ischium resists the pushing up of the split.

Fracture of the Leg. In this case Pott supposes it to be the best for the leg to lay upon its side by drawing up the knee & letting the bed fall out, but a pillow I think will do as well, the intention of Mr Pott was to let the gastrocnemii muscles be relaxed which would be by ~~drawing~~ raising the leg, tho as I just now said that a pillow will do, which being placed under the leg, & may now be applied under the knee so as to elevate it & favour the relaxed position of the muscles of the leg, when the leg is thus elevated it prevents such a return of blood to it & is of much consequence, if the patient complains of any pains which is sometimes the case, that they will complain of pricking pains &c then we should take away all splinters &c. & may suppose that something is the cause, either the parts or points of the bones do not rightly agree or the like &c.

I was called to a boy who had his leg broke near the ankle, splints was applied by someone when I went, the boy complained of very excruciating darting pains of the part, I immediately threw off from the fracture all the compresses & splints & found that the part was much inflamed & several blisters of a blue look was upon the part & threatened gangrene, I no more applied these splints &c. & washed it with a solution of sugar of lead, or ammonia, & used fomentation of the bitter herbs & he recovered & the leg was as strait as if there had been splints. which if those splints had remained I believe he would have certainly died.

February 28th

Concussion & Compression of the Cranium. . . It is sometimes difficult to distinguish between concussion & compression, tho' compression act more sudden & violent, I was called to a boy who was to

ken violently & suddenly with coma, & after a few minutes would recover & shortly be taken & drop down, he was in a coma when I saw him, after a strict inquiry I found that he had received a stroke on the head, I immediately examined his head & found a large tumor & appeared as if the cranium was fractured, I immediately cleared away the hair & made an incision clear crofs the tumor with a scalpel & found the cranium not hurt, but while I was thus opening this tumor, the pain & irritation which it give, excited action in the boy & ~~sou~~ed him & by evacuations by bloodletting &c. was soon well. There are many diseases which affect the brain in this way, as the, ~~epilepsy~~, hydrocephalus, apoplexia, ~~gout~~ etc. These diseases compress the brain & cause those distressing symptoms; I knew a Gentleman who in perfect health, went to bed at night, next morning when awoke was taken with stupor & coma, and

continued so for two or three days, he was bled but with very little effect, after the end of two or three days these symptoms suddenly disappeared, & immediately seized with pain in his big toe, which was a confirmed gout. When we are called to patients who are senseless in consequence of blows or the like on the head, the first thing is to examine strictly the cranium to see if it be not fractured or compressed, this must be done by making an incision across the part injured & inspecting it, & if any part of the cranium be driven in upon the dura mater & compressing it, we need not expect our patient to be free or recover from these distressing symptoms, therefore when we find this to be the case we must have recourse to operating, if any end of a bone be sent in try to get it out with the forceps, or if there be a depression in the cranium & if there be a whole to

introduce something to elevate it, it will be proper but if this be not the case we must have recourse to the trepan, we should always be certain of there being no hopes of a recovery before we attempt to operate I was called to a woman in this case who had received a blow from a bit of scantling of an immense height in my examination of instructing the part, she seemed to show some symptoms of surviving therefore I waited with patience & she seem to be much better I went off but show that the cranium was injured, & fully expected to be sent for in a short time, but it so happened that the cranium was not compressed & by which she had no return of coma &c. but when we are to operate with the trepan, we are to beware of pressing the fractured part in further, therefore to avoid this, after having opened the skin in form of a tee or three (T) throwing back the skin to-

as it may come off the part & cover it after the operation, we have one half of the round saw to be on the fractured part & the other half or the round part, & thus going on gradually & cautiously. when collections of blood or the like is formed under the cranium & causes terrible & perpetual pain & coma, this I term to be the most difficult of all diseases to determine where we are to operate, therefore have the head shaved & whenever any part appears suspicious operate upon it, but we are never certain without we see a sign of it externally, which is seldom the case, I have know surgeons after opening in the wrong place, to have a long probe & pushing it for some space all around between the dura mater & periosteum, & by this finding

the tumor & discharging the contents; this I have a frenc sergeant to to with effect. mind in our operation that no blood be let in the opening, have a sponge & wipe it clean & when vacantly through take hold of it with a kind of forceps & try to tear it loose, this is better than trusting to raking clear through for fear of injuring the aorta; after we am let out the contents &c. let the skin come over it again &c. . . . . .

Thus Gentlemen we finish the course of our long, tedious, & laborious Lectures, & am extremely happy & verymuch thank you for the strict attention you have bestowed to me; & thus hope charitably that you will remain so, that is, to study with pleasure & attention . . Februa. 28th . . 1801